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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/709,616	11/13/2000	David W. Warren	12.150	4083

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EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/709,616	WARREN ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2005 and 31 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 8, 2005 has been entered.

Response to Amendment

2. Applicant's amendment and remarks submitted on April 8, 2005 and January 31, 2005 have been received and carefully considered. Claims 13 and 14 are cancelled. Claims 1-12 and 15 remain active.

Claim Objections

3. Claims 1, 3, 7, 10 and 15 are objected to because of the following informalities:

In claim 1, line 20, "reactor." should be changed to --reactor, and--.

In claim 3, line 3, --the-- should be inserted before "space".

In claim 7, line 3, --an-- should be inserted before "annular space".

In claim 10, line 2, --a-- should be inserted before "helical".

In claim 10, line 3, --a-- should be inserted before "hourly".

In claim 15, line 6, --and-- should be inserted after "generator".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The following is a quotation of the sixth paragraph of 35 U.S.C. 112:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

4. Claims 1-12 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, it is unclear as to the structural element(s) that define "an outer region" (lines 9-10) of the apparatus. Also, it is unclear as to the structural limitations applicant is attempting to recite by, "all of said bed extending only helically and about the steam generator" (lines 12-13), "the helical bed" (line 16), and "said bed being a single bed and continuous in the helical direction of guided flow" (lines 17-19), because it is unclear as to how a bed can extend helically. Also, "the catalyst" (line 15) and "the helical bed" (line 16) lack proper positive antecedent basis, and it is unclear as to the relationship between "the catalyst" in line 15 and "a catalyst bed" in line 11.

Regarding claim 5, it is unclear as to the structural limitation applicant is attempting to recite by, "the catalyst bed extends helically" because it is unclear as to how a bed can extend helically.

Regarding claim 7, it is unclear as to the relationship between the "annular space" (line 3) and the "outer region" set forth in claim 1, line 9. Also, it is unclear as to the structural

limitation applicant is attempting to recite by, "the catalyst helical bed" (line 6) because it is unclear as to how a bed can extend helically. Also, "the catalyst helical bed" lacks proper positive antecedent basis.

Regarding claim 8, it is unclear as to the structural limitation applicant is attempting to recite by "the catalyst bed is sufficiently close to said generator" because it is unclear as to what distance is "sufficiently close".

Regarding claim 11, "combustion products" (line 4) lacks proper positive antecedent basis. Also, it is unclear as to the structural relationship of "a boiling water fluid" (line 4) to the other elements of the apparatus.

Regarding claim 15, it is unclear as to the structural limitation applicant is attempting to recite by, "catalyst all of which extends only in a substantially helical path" (lines 3-4) because it is unclear as to how a catalyst can extend only in a substantially helical path.

5. Claim 15 is rejected under 35 U.S.C. 112, sixth paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, it is unclear as to the corresponding structure specified by the "means" in line 3. Also, the limitation has not been written in a proper "means-plus-function" format (e.g., means for ....).

Claim Rejections - 35 USC § 102 and § 103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 15 is rejected under 35 U.S.C. 102(b) as being anticipated by Steiner et al. (US 4,134,908).

Steiner et al. (FIG. 9; column 4, line 67 to column 5, line 21) discloses in combination,

a centrally located steam generator (i.e., central cooling tube **500**); and means including catalyst (i.e., catalytic strip or ribbon **504**, including a nickel methanation catalyst; column 5, line 53-63) all of which extends only in a substantially helical path (i.e., as defined between an outer tube **502**, the cooling tube **500**, and the ribbon **504**) about the steam generator and in heat transfer relation with the generator; said catalyst receiving gases (i.e., a feed gas via header **512**) all of which flow along said path and react in the presence of the catalyst to produce exothermic heat (i.e., from a highly exothermic methanation reaction; column 1, lines 10-45) that is

transferred laterally of said path to the generator.

Although a reaction temperature of "between 400 °F to 550 °F" is not disclosed by Steiner et al., the apparatus of Steiner meets the claim because the reaction temperature is a process limitation that holds no patentable weight in apparatus claims.

Instant claim 15 structurally reads on the apparatus of Steiner et al.

7. Claims 1-10 are rejected under 35 U.S.C. 102(b) as anticipated by Steiner et al. (US 4,134,908), or, in the alternative, under 35 U.S.C. 103(a) as obvious over Steiner et al. (US 4,134,908) in view of Muenger (US 3,666,682).

Regarding claims 1 and 3-5, Steiner et al. (FIG. 9; column 4, line 67 to column 5, line 21) discloses in combination,

a centrally located waste-heat recovery steam generator for recovery of exothermic reaction heat to generate steam (i.e., comprising a central cooling tube **500**, for generating steam from cooling water supplied by water header **508**);

an outer region (i.e., defined by the annular space, between outer tube **502** and cooling tube **500**) extending at least part way about said waste-heat recovery steam generator **500** and in heat transfer communication with the steam generator **500**; and

a catalyst bed (i.e., a nickel methanation catalyst; column 5, lines 53-63) located within said outer region, all of said bed extending only helically and about the steam generator **500**; there being flow guide surfaces (i.e., as defined by the turbulator strip or ribbon **504**) extending helically adjacent the catalyst (i.e., in the case of "the nickel catalyst plated or coated by deposition" on the surface of a turbulator made of dissimilar metal) to direct all gases to flow only helically (i.e., "In passing through the annular space within the methanation tubes the feed

gas follows a spiral path along the surface of the catalytic strip or ribbon **504**," column 5, lines 15-17), the bed located entirely outside and proximate to the steam generator **500**, the bed being a single bed and continuous in the helical direction of guided flow about the steam generator **500**; (see FIG. 9).

Because the particular composition of catalyst is not instantly recited in the claim, and the operation of a water-gas shift reaction for producing the exothermic reaction heat is recited as intended use, the apparatus of Steiner et al., despite having a methanation catalyst for conducting a methanation reaction, structurally meets the claim.

Alternatively, it would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute another type of catalyst, such as a water-gas shift reaction (Cu/Zn) catalyst, for the methanation catalyst in the apparatus of Steiner et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the examiner takes Official Notice that it is well known in the art to substitute a different type of catalyst in a reactor in order to catalyze a different chemical reaction. It is further well known in the art that the water-gas shift reaction is exothermic and, similarly, requires active heat removal and temperature control in order to attain the desired CO conversion, as evidenced by Muenger (column 1, lines 10-30). In particular, Muenger teaches an apparatus comprising a water-gas shift catalyst **5** (i.e., which may be a conventional, low temperature shift catalyst comprising copper and zinc oxide; column 3, lines 61-75) that is in thermal communication with a steam generator, as defined by heat exchangers **3** and **4**, in order to control the temperature of the catalyst bed (column 5, lines 10-23; column 6, lines 8-23).

Regarding claim 2, the apparatus of Steiner et al. structurally meets the claim because the

temperature at which the waste heat steam generator **500** operates is not considered an element of the apparatus but a process limitation that has not been given any patentable weight.

Regarding claim 6, the flow guide surfaces as defined by the helical strip or ribbon **504** inherently comprises a heat transfer fin, being that the strip or ribbon **504** is composed of metal and therefore thermally conductive.

Regarding claims 7, 9 and 10, Steiner et discloses an inner wall (i.e., as defined by the outer surface of cooling tube **500**) and an outer wall (i.e., defined by the inner surface of outer tube **502**) for defining an annular space containing the helical bed **504**, wherein the flow guide surfaces comprise a helical coil (i.e., a helically shaped ribbon or coil). Also, the helical length of the bed is selected to define a gas hourly space velocity within the instantly recited range (i.e., "Typically, the gas space velocity will range from 1800 to as high as 8000 v/v/hr," column 3, lines 45-47). Steiner et al., however, is silent as to the annular space being between 1 and 2 inches wide. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate width for the annular space in the apparatus of Steiner et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because it has been held that changes in size involve only ordinary skill in the art, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), *In re Aller,* 105 USPQ 233.

Regarding claim 8, the catalyst bed **504** is located adjacent to the steam generator **500** (see FIG. 9) and therefore, the catalyst bed is, inherently, sufficiently close to said generator **500** for the generator to maintain temperature control of the bed. Although Steiner et al. is silent as

to the catalyst bed being maintained within the recited temperature ranges, the apparatus of Steiner et al. structurally meets the claim because the temperature of the catalyst bed is not considered an element of the apparatus but a process limitation that has not been given any patentable weight.

8. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as obvious over Steiner et al. (US 4,134,908) in view of Muenger (US 3,666,682), as applied to claim 1 above, and further in view of Collins et al. (US 5,458,857).

Steiner et al. further discloses the steam generator including an upright vessel (i.e., a steam drum **506**), and said outer region having an upper level inlet **514** and a lower level outlet **518** (see FIG. 9). Steiner et al. is silent as to the waste heat steam generator comprising one or more heat transfer conduits that transfer heat from combustion products to the water for generating steam. Collins et al. (FIG. 3, 7; column 11, lines 29-46) teaches a waste heat steam generator **416** comprising one or more heat transfer conduits (i.e., start up tubes **417**) for transferring heat from combustion products to the water for generating steam. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide one or more heat transfer conduits to the apparatus of Steiner et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the heat transfer conduits allows the reactor to be rapidly brought up to the required operation temperature, as taught by Collins et al.

Response to Arguments

9. Applicant's arguments with respect to claims 1-12 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
June 23, 2005 JAL

Hien Tran

HIEN TRAN
PRIMARY EXAMINER